

**MODERN THEORY AND NOTATION
OF BYZANTINE CHANTING
TRADITION
A NEAR-EASTERN MUSICOLOGICAL
PERSPECTIVE**

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INTRODUCTION¹

Greek-Orthodox Christian chanting tradition, widely known as “Byzantine music”, is a strictly liturgical, monophonic vocal practice which has more than one and a half thousands of years of continuous history, being one of the most important ritual music traditions in the Eastern Mediterranean area. Notwithstanding its very conservative character, its musicological profile indicates long and multileveled interactions with the plethora of sacred and secular music idioms, found in the area of Near and Middle East. Nevertheless, its peculiar theoretical and notational systems constitute a different philosophy of analyzing and depicting modal monophonic music; in so doing it offers an interesting alternative to the more widely known models of Turkish and Arabic musicology².

In the formation of the distinctive musicological profile of Byzantine chanting tradition a series of particularities must have played an important role. Firstly the above mentioned strictly liturgical character of the tradition, along with the aesthetic austerity of orthodox theology, forced this art to remain purely vocal. Moreover, the dominant role of the religious poetry over the musical dimension is more than obvious in the structure of the compositions; for the melody, rhythm and form serve to underline the meanings and religious messages of the poetic text. Apart from the stylistic peculiarity, the above principles result in a rhythmic structure which follows the metric structure of the text,

and forms the so-called “tonic rhythm” – to some extend reminiscent of the Persian *Avaz*³.

Besides the lack of a canonical periodicity in rhythm, the specific morphology of the tradition categorizes forms of compositions according to the liturgical role and content of the poetic text, as well as the number of syllables per unit of time. Furthermore, the absence of instruments leaves more space for subtle nuances in tonality of the degrees, by means of a large number of non-tempered intervals; thus complying with the complicated rules of the so-called “melodic attractions”. This multi-intervallic tonality is organized in manifold ways to form the old fashioned hierarchical system of the *Octoechos*, which serves as a categorization of melodic material based not only on modal but also on morphological and textual characteristics⁴.

The notational system constitutes another important peculiarity of this tradition, being very different in its philosophy, structure and symbols, from all the others that have existed from ancient to contemporary time in the Eastern Mediterranean, as well as the Near and Middle East. The new *parasemantiki* notation, established in the beginning of 19th century, is a highly asymmetric symbolic language using a non-phonemic orthography where the pronunciation of its graphemes often depends on the adjacent phrasal context as well as rhythmic, temporal and modal parameters.

Despite the long tradition of theorizing and the large number of musicological literature dealing with the plethora of phenomena involved in Byzantine chanting practice from the ancient times till today, and regardless of the overabundance of transcribed compositions of eponymous composers, this tradition retains its highly oral character. It is this oral character that leaves plenty of free space to the actual performer to interpret a composition in his/her own personal taste, modifying phrases, time and even the intervallic and modal physiognomy of a piece.

The beginning of the 19th century coincides with the commencement of the modern period of Byzantine chanting history both in terms of theory and notation⁵. The formation of the contemporary Byzantine chanting musicological profile is mainly based on the “reform of 1814” introduced by the celebrated “three masters”, Chrysanthos of Madytos, Chourmouzios Chartofylax and Gregorios Levitis, the announcement of the Patriarchical “Musical Committee” published in 1888, and the work of K. Psahos, S. Karas and G. Stathis in the twentieth century. The present account of modern Byzantine music theory starts with an outline of the contemporary notational system along with a more general account of the most important aspects of the reform of the “three masters”.

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THE NEW PARASEMANTIKI NOTATION⁶

The long history of evolution of the Byzantine notational system *parasemantiki*, reached a critical point at the beginning of the nineteenth century. The “old method” was a partly stenographic system which employed a large variety of symbols, many of which – called “large hypostaseis” – stood for whole musical phrases which were memorized by the practitioners, functioning as a mnemonic code of a system which in practice depended mainly on oral transmission⁷. Many reports from this period attest the ambiguity and impracticality of the method as well as the difficulty of learning it⁸. Attempts to present explanations of the old stenographic method by means of a more analytical notational system started back in the sixteenth century. The first serious attempt was made by the priest Balasios (17th c.) who was followed by a long tradition of the so called “exegetists” (lit. “interpreters”), the most important among them being Ioannis Trapezountios, Petros Peloponnesios (1730-1770)⁹, Petros Byzantios and Georgios Kris¹⁰. The completion of this long evolution came with the introduction of the new analytical method by the above mentioned “three masters”. Although the customary term “new method” refers mostly to notation, the reform contained a broad reconstruction of the whole theoretical model, mainly expressed through the books of Chrysanthos published in 1821 and 1832, which along with the subsequent announcement of the Patriarchical “Musical Committee” of 1881 became the three most influential texts in the history of Byzantine chant, signalling the beginning of the modern period of its theoretical analysis¹¹. The overall reform of the theoretical model was based on a rehabilitation of Ancient Greek musicological elements along with ideas influenced by Middle Eastern as well as Western music theory. However, the establishment of the “new method” did not come about automatically, due to extensive reactions such as the alternative system introduced by Georgios Lesbios - recognized by the Greek government of Kapodistrias and used in Athens until 1948¹² – or the perseverance in the use of the “old method” by leading chanters for long after the introduction and approval of the new one¹³. A long series of attempts to harmonize Byzantine music and employ Western staff notation for its transcription provoked a reaction of the Ecumenical

Patriarchate, expressed mainly by the constitution of the aforementioned “Musical Committee” in 1881.

With the new *parasemantiki* a large number of the older signs were abolished – among them all the “large hypostaseis” – and the significance of the ones that were preserved was more precisely determined. The duration of each sign was accurately defined and special symbols concerning prolongation of duration and pauses of the melody were introduced. A set of signs called *martyries* (lit. “witness sign”) and *fthores* (lit. “vitiation, decay”)¹⁴, having developed from the already existing symbols in the old notation, made it possible to depict more precisely the elaborate nuances of this music. Chourmouzios, Grigoris and the latter’s students transcribed about a hundred volumes of music into the new analytical notation¹⁵. Chrysanthos’s western education must surely have influenced him to introduce the solfège type system of *paralagi* using the monosyllabic terms *ΠΑ* (pronounced pa) for the letter Α of the Greek Alphabet, *ΒΟΥ* (pronounced vou) for the letter Β, *ΓΑ* (pron. ya) for Γ, *ΔΙ* (pron. thee) for Δ, *ΚΕ* (pron. ke) for Ε, *ΖΩ* (pron. zo) for Ζ and *ΝΗ* (pron. ni) for Η. Table 1 depicts the *martyries* of the two-octave “natural” “mild diatonic” or “basic” scale of Byzantine theory along with the one-to-one correspondence of its degrees with the Middle Eastern equivalents¹⁶. These new solmisation syllables replaced the old polysyllabic terms (*ananes*, *neanes*, *neheanes*, etc.), which, however, had a manifold role signifying not only a specific degree but also an interval, an *Echos* and its *apechema*.

The new *parasemantiki* has remained the same until today – the only serious attempt to modify it was that of Karas and his followers who reintroduced a number of older signs, a move that gave rise to a serious dispute. This notational system, being the culmination of a long process of evolution that lasted over a century, is a highly analytical one. Its main philosophy is on the quantitative level to numerically specify the ascending or descending melodic steps, in the frame of a certain mode-*Echos*, while at the same time determine the temporal value of these steps, and on the qualitative level to elaborately describe the way these moves have to be performed. Standard contemporary texts include ten simple and around sixty composite quantitative signs, which designate the number of degrees covered by each ascending or descending shift.

solmisation syllables (degree names)	$\delta\iota$	$\kappa\varepsilon$	$\zeta\omega$	$\nu\eta$	$\Pi\alpha$	<i>Bou</i>	$\Gamma\alpha$	$\Delta\iota$	$\kappa\varepsilon$	$Z\omega$	$N\eta'$	$\Pi\alpha'$	<i>Bou'</i>	$\Gamma\alpha'$	$\Delta\iota'$
Martyries															
Equivalent Ottoman-Turkish degree names	<i>Yegah</i>	<i>Hüseyini Aşiran</i>	<i>Irak</i>	<i>Rast</i>	<i>Dügah</i>	<i>Segah</i>	<i>Çargah</i>	<i>Neva</i>	<i>Hüseyinl</i>	<i>Eviç</i>	<i>Gerdaniye</i>	<i>Muhayyer</i>	<i>tiz Segah</i>	<i>tiz Çargah</i>	<i>tiz Neva</i>

Table 1. Degree names and the *martyries* of the fundamental scale.

There are six temporal signs indicating prolongation of duration of the notes or alteration of time division as well as special signs for pauses. Even though temporal division resembles the 1, 2, 4, 8, 16 logic of Western music, actual time values are never as simple as that in practice¹⁷.

Furthermore there are six qualitative signs indicating ornamentation, phrase analysis or details in the expression depending on their position. In table 2 the function of some of the most important signs is explained to give an idea of the structure of the system.

At the beginning of each composition we find the *arktiki martyria* (lit. “introductory witness sign”) of the *Echos*, which is used to state the modal environment of the melody, followed by a sign determining the tempo of the chant. *Martyries of echoi* are special signs inherited

from the old method. They contain information about the genus, the type of the *Echos* (i.e. *Plagal* or *Kyrios*) as well as the position of the *vasi* or the starting note of the chant on the “general” scale. In this light, their function can be seen as roughly equivalent to the declaration of the *Makam* at the very beginning of a Turkish or Arabic score.

The *martyries* of the degrees are a set of signs, one for each degree of every scale, playing a multifaceted role in this notational system. Each one of these signs consists of two parts, one on top of the other. One is the first letter of the corresponding solmisation syllable (π for *Πα*, β *Bοv* etc), and the other a special sign depending on the *genus* or *chroa* this note is part of as well as its exact intonation (see also table 1). They are employed at certain points of the score to bear witness to the degree on which the melody cadences.

The Basic Signs of <i>Parasimantiki</i>			
Category	Name	Symbol	Function
The Main Quantitative Signs	Ison		(0) Equality or repetition of the same degree
	Oligon		Ascending seconds,
	Petasti		(+1) each one having its own qualitative character
	Kentimata		
	Kentima		(+2) Ascending third
	Ipsili		Ascending fifth
	Apostrofos		(-1) Descending second
	Elafron		Descending third
	Heporoe		(-1-1) Two consecutive descending seconds
Some common combinative signs	Chamili		(-4) Descending fifth
			(+2) Ascending third
			(+3) Ascending fourth
			(+4) Ascending fifth
			(+5) Ascending sixth
			(+6) Ascending seventh
			(+7) Ascending eighth
	Sinehes Elafron		(-1-1) Two consecutive descending seconds
			(+1+1) Two consecutive ascending seconds
Qualitative Signs	Varia		
	Psifiston		
	Ormalon		
	Antikenoma		No quantitative or time value but complicated qualitative behavior implied
	Sindesmos		
	Endofonon		
Temporal signs	Klasma		Superadding 1 time unit
	Apli,Dipli,Tripli		Superadding 1,2,3 time units respectively
	Gorgon		Dividing one time unit in
	Digorgon		2,3,4 notes respectively
	Trigorgon		
	Hemigorgon		All the above temporal signs can appear in a variety of dotted forms
Composite temporal signs	Trihemigorgon		
	Argon		Gorgon + Apli
	Diargon		Gorgon + Dipli
Silences	Triargon		Gorgon + tripli
	Pause		Its duration specified by the Apli,Dipli or Tripli following
	Cross		Breath sign of undetermined duration

Table 2. Basic signs of *parasemantiki*.

Specific alterations of the intonation of the degrees are reflected in the relevant alterations of the corresponding *martyries*, in a way that is capable of indicating modulation. As will be further explained below, the mild *diatonic genus* is the reference point of this modal system and therefore the degrees that belong to other *genera* or to *chroes* are considered altered and are called *fthorikes*. In table 3 we can see the altered *fthorikes martyries* for the other *genera* ("tense" *diatonic*, "mild" and "tense" *chromatic*) as well as the three *chroes* (*Kliton*, *Zygos* and *Spathi*)¹⁸. Careful observation of these *fthorikes martyries* reveals several symmetries of the Octoechos complex. Thus, in the case of the tense *diatonic* genre, we can see that the sign pattern $\text{2} \text{2} \text{1} \text{1}$ is repeated revealing the periodical repetition of the same tetrachordal scheme following the *trifonia-tetrachordon systema* explained below. Furthermore, in the case of mild and tense *chromatic* genres, the sign patterns $\text{1} \text{2} \text{1}$ and $\text{2} \text{1} \text{2}$ are repeated as well, revealing the periodical repetition of the same trichordal scheme, following the *omoia diforia* believed to stand for the case of *chromatic genera*¹⁹. Finally, the *martyries* of *Kliton*, unveil the use of the mild *diatonic* scheme $\text{1} \text{2} \text{3} \text{4}$ transposed a major tone higher on *Πλα*, revealing the *Kliton-Nišabur* logic of transposition of *Rast* tetrachord on *Diigah perde*²⁰.

Both Chrysanthos [1821, p. 22] and the Committee of 1881 [1888, p. 43] made an attempt to further specify the intonation of the specific degrees by introducing additional symbols for flat and sharp signs. As a result the existing system today uses a special symbol for each one of 2, 4, 6, 8 and 10 *trimata* flat or sharp as shown in table 4²¹. Even though at first sight these signs seem to be equivalent to the additional flat and sharp signs of the Turkish system they are rarely used in scores but are generally employed only in theoretical descriptions of *echoi* where they serve to specify the intervals of the scale.

Sharp signs	$\text{1}^{\#}$	$\text{2}^{\#}$	$\text{3}^{\#}$	$\text{4}^{\#}$	$\text{5}^{\#}$
Alteration in <i>tmimata</i>	2	4	6	8	10
Flat signs	1^{\flat}	2^{\flat}	3^{\flat}	4^{\flat}	5^{\flat}

Table 4. Alteration signs in *parasemantiki*.

The "school" of S. Karas differentiated itself by using these signs extensively in scores²².

THE INTERVALLIC PLURALISM OF A STRICTLY VOCAL TRADITION, THE ANCIENT "HARMONIC SCIENCE" AND THE "THEORY OF RATIOS"

Measuring the actual intervals used in practice has been at the heart of the research interest of theorists since the times of Pythagoreans. The long tradition of intervallic theory developed in ancient Greece was continued by Byzantine as well as Middle Eastern theoreticians who all held in high esteem the mathematical representation of intervals.

Apparently this tradition declined after the fifteenth century so that at the time of the founder of Ottoman-Turkish theory Dimitrie Cantemir, accurate descriptions of intervals seem to have gone out of fashion. A first attempt to return to mathematical precision was made by Chrysanthos in his theoretical treatise²³.

The re-establishment of this aspect of modal theory was completed by the Patriarchical Committee's announcement²⁴, which contained the statistical results of physical measurements of the actual intervals played in practice, made by means of a monochord and the "*Ioakimeion psaltirion*", a type of organ (wind with clavier) especially made for this purpose.

Today the Aristoxenian idea of representing intervals by way of an "arithmetic" method – i.e. measuring their size by means of a reference unit/interval – has predominated worldwide over the Pythagorean "geometric" method which uses mathematical ratios. Apart from the unquestionable simplicity of all arithmetic methods as compared to geometric ones, another reason for the displacement of the latter is the introduction by A. Ellis²⁵ of the method of dividing the octave into 1200 cents, which being a very useful, Western-oriented tool, quickly dominated the musicological scene. By contrast, modern period Greek theorists have written much in an attempt to revive the ancient Greek tradition of mathematically detailed music treatises, making extended use of the theory of ratios.

Fthorikes Martyries										
	<i>vη</i>	<i>Πλα</i>	<i>Bou</i>	<i>Γα</i>	<i>Δι</i>	<i>Κε</i>	<i>Zw</i>	<i>Nη'</i>	<i>Πλα'</i>	<i>Bou'</i>
"Tense" Diatonic	v 2	π $\text{1}^{\#}$	6 q	1^{\flat} η	Δ 1^{\flat}	\times q	z' η	v' 1^{\flat}	π' q	$\text{6}'$ η
"Tense" Chromatic	v 1^{\flat}	π	6 2^{\flat}	1^{\flat}	Δ 1^{\flat}	\times 2^{\flat}	z' 2^{\flat}	v' 2^{\flat}	π' 2^{\flat}	$\text{6}'$ 2^{\flat}
"Mild" Chromatic	v 2^{\flat}	π	6 3^{\flat}	1^{\flat}	Δ 2^{\flat}	Δ 2^{\flat}	z' 2^{\flat}	v' 2^{\flat}	π' 2^{\flat}	$\text{6}'$ 2^{\flat}
<i>Chroa Kliton</i>		π 1^{\flat}	6 2^{\flat}	1^{\flat}	Δ 2^{\flat}					
<i>Chroa Zygos</i>	v 1^{\flat}	π	6 2^{\flat}	1^{\flat}	Δ 2^{\flat}					
<i>Chroa Spathi</i>				1^{\flat} η	Δ 1^{\flat}	\times q	z' η	v' 1^{\flat}		

Table 3. *Fthorikes martyries*.

The first concern of theoreticians has always been the definition of the so-called “natural”, “basic” or “mild” *diatonic* octave scale depicted on table 1, whose primary role will be explained below. Using as a starting point the degree $\nu\eta$ (corresponding to *Rast perde*²⁶), the ambiguity has always been related to the intonation of the third degree *Bov* (*Segah perde*) and the seventh *Zω* (*Eviç perde*), since the rest are all agreed to be tuned to the Pythagorean major tone (9/8), minor third (32/27), natural fourth (4/3), fifth (3/2) and major sixth (27/16)²⁷. Starting with the reform of 1820s, Chrysanthos suggested 12/11 as the predominant *diatonic* minor second for the intervals *Ila-Bov* (*Dügah-Segah*), *Ke-Zω* (*Hüseyini-Eviç*) and *ζω-νη* (*Irak-Rast*) degrees²⁸, an interval closer to the Arabic aesthetics placing these neutral tones on the quartertones (12/11 = 151 cents) and the resulting thirds (e.g. $\nu\eta$ -*Bov* or Δ -*Zω*) on the Zalzalian geometric means (27/22 = 354.55 cents). The Committee of 1881, with the help of leading practitioners and the use of a measuring instrument, came down with some interesting suggestions like the *diatonic* major third 100/81 (=10/9)*(10/9)²⁹ that is one comma lower than the Didymian³⁰ 5/4, the resulting *diatonic* minor second 800/729 (100/81 ÷ 9/8) and the remaining semitone completing the *diatonic* tetrachord 27/25 (=9/8)*(24/25)³¹. Other authors like Hatziathanasiou³² and Eftimiades³³ stuck to the so-called Pythagorean and Didymian suggestions, proposing the just *diatonic* major third 5/4 for the above cases. The next major contribution in this direction is Karas's extended analysis³⁴ which brought back intervals first suggested by ancient theorists such as Archytas, Didymos, Claudio Ptolemaios, Zalzal or Farabi and recommended among others the division 9/8-54/49-784/729 for the mild *diatonic* tetrachord. His follower Lykouras, who published a highly mathematical survey which not only summarizes the contributions of Greek and medieval Arab and Persian theoreticians in the subject but further extends them as well, argued that the main minor tone used in Greek music is 11/10³⁵.

These suggested values for the intervals *Ila-Bov* and *Ke-Zω* present a large deviation ranging from the three quarter neutral tone 12/11 (151 cents) to the minor tone 10/9 (182 cents). Besides the normal deviation due to stylistic diversities among chanters from different areas or schools, or the variations depending on the different scholars' measuring or estimation methods, the most important reason is probably the special role these two degrees play in the development of all *diatonic* melodic movements. This role, which is connected to the phenomenon of “melodic attractions” and will be further clarified below, demands that these two degrees (*Bov* and *Zω*) are highly mobile. Due to the high fluidity of intonation in this tradition, all the suggestions concerning intervals refer to their “nominal values” and should be conceived as defining the “reference” or “equilibrium”

positions of the degrees involved, around which the latter deviate depending on the melodic context³⁶. Apart from the intonation of the aforementioned ambiguous degrees, the researchers' attention focused also on the relative position of the degrees of *chromatic* or enharmonic intervallic arrangements, some of which will be presented in the following section³⁷.

It was Chrysanthos again who introduced the arithmetic representation of intervals assigning 12 *tmimata* (lit. “parts”) to the major tone in accordance with Cleonides' *dodekatimoria*³⁸. The rest of his choices though, such as that of the 68 *tmimata* for the octave, 9 for the 12/11 and 7 for the 88/81 neutral seconds, do not constitute a mathematically consistent system and were rejected by most subsequent scholars including the Patriarchical committee. The latter's more methodical and scientifically oriented work on this subject, resulted in a system dividing the octave into 36 parts assigning 6 to the major tone, 5 to the minor and so on. A combination of the two is the standard arithmetic system used in contemporary Byzantine music theory – already explicitly described by Cleonides in the second century (?) A.D.³⁹, dividing the octave in 72 *dodekatemoria* – i.e. one twelfth of a major tone – assigning 12 *dodekatemoria* (or *tmimata* as they are called today) to the major tone, 10 to the minor and 8 to the so-called “least” tone. This arithmetic system served as a symmetric and pedagogical tool that inevitably dominated everyday communication between practitioners. A few scholars questioned its accuracy, among who were Misaelides⁴⁰ and Karas⁴¹. The latter trying to correct the misleading picture this system gives for several intervals such as the Pythagorean *lemma* – which being assigned the value of 6 *tmimata* (exactly half of 12) is erroneously confused with the Western equal-tempered semitone – used non-integer numbers like the 5 ½ or the 7 ½ and provoked numerous negative reactions among Byzantine music specialists. The exact calculations of the arithmetic values of the most frequently mentioned intervals can be seen in Table 5 where their values are presented in three arithmetic systems, dividing the octave in 72 (Byzantine *tmimata* or *dodekatimoria*), 53 (Mercatoric commas) and 1200 equal parts (A. Ellis's cents) respectively.

TETRACHORDS AND PENTACHORDS AND THEIR CATEGORIZATION IN GENERA⁴²: THE “MILD” AND “TENSE” DIVISIONS OF DIATONIC AND CHROMATIC GENERA

Next step after the level of intervals is their smallest combinations-arrangements in sets of three or four consecutive, building up the so-called “subunits” of musical scales known as *tetrachords* and *pentachords*. This idea, which first developed in ancient Greece⁴³, has been broadly used in the modal systems of Persians, Arabs,

Turks and Indians⁴⁴. *Tetrachords* and *pentachords* (lit. “four-stringed” and “five-stringed” respectively⁴⁵) most probably owe their names to the sets of four or five consecutive strings of harp-type instruments widely used in the entire ancient world, tuned to the successive degrees of a scale subunit. In Greek-Byzantine theory they have always been conceived as arrangements of four or five consecutive notes such that their upper and lower boundaries are a perfect 4th and 5th apart, in contrast with the equivalent system of *dörtlüsü* in Turkish theory where they can also be “incomplete”⁴⁶.

The concept of *genus*, which is an important aspect of modern Byzantine chanting theory, provides a classification of tetrachordal and pentachordal units according to the type of intervals they employ, in accordance with the ancient definition of *genus* given by Aristides Kointilianos⁴⁷.

Dividing a set of entities into *genera* is a long-standing tradition in Greek music theory, applied to a variety of aspects such as tetrachords, scales, modes, as well as rhythms and genres⁴⁸.

Although the use of the *genus* concept had never been entirely abandoned, Chrysanthos and Stefanides are responsible for returning the division into *genera* to a conspicuous position. Karas gives a definition of *genus* as “a set of musical modes that employ the same or similar intervals constituting a family or modal class”⁴⁹. This categorization in terms of types of intervals used, is most applicable at the level of tetrachords and pentachords, while on the higher level of scales and *echoi* we have many composite instances employing intervals from more

than one *genus*. According to this ancient theory, the theoretically infinite ways of dividing the tetrachord into three intervals fall into three general categories, the *diatonic*, the *chromatic* and the *enharmonic genus*, while the first two *genera* can be further divided in various subcategories called *chroes*⁵⁰. Modern explanations⁵¹ following the latter division separate the *diatonic* and the *chromatic genera* into two subcategories, the “mild” and the “tense”.

The “mild” *diatonic* is considered the foundation of the whole modal system providing with the “basic” or “natural” scale, which generates the primary modal entities. It employs all three categories of tones (“major”, “minor” and “least”) in every tetrachord while the “tense” *diatonic* uses only “major” tones and Pythagorean *lemmas* (for details on the intervals see the catalogue given by Table 2)⁵². As already mentioned above, the prevailing opinion on the “nominal” values of the intervals employed by the mild *diatonic* genus is the one suggested by the Patriarchical “Musical Committee” which given in Byzantine *tmimata* (B. T.) assigns 12 to the major tone, 10 to the minor one and 8 to the least. The approximate values in Mercatoric (M. C.) commas⁵³ are 9, 7 and 6 respectively⁵⁴.

It is worth citing here the corresponding suggestions of Chrysanthos : In the arithmetic method he suggests 12, 9 and 7 in *tmimata* corresponding to 9, 6.75 and 5.25 in M. C., being though inconsistent with his frequency-ratio values in the geometric method, which given in commas they roughly correspond to 9, 6.5 and 6.5.

Catalog of the most popular intervallic ratios and their arithmetic values in 3 systems				
	Geometric Method	Arithmetic Methods		
	Frequency Ratios	Merkatoric commas	Byzantine <i>tmimata</i>	cents
Octave	2/1.	53	72	1200
Fifth	3/2.	31	42.18	702
Fourth	4/3.	22	29.88	498
Major third "Ditone"	81/64.	18.01	24.47	408
Just or "mild" diatonic major third	5/4.	17.06	23.17	386
"Zaizalian" mean	27/22	15.66	21.27	355
Just "diatonic" minor third	6/5.	13.94	18.94	316
Pythagorean minor third	32/27	12.99	17.65	294
Enharmonic minor third	7/6.	11.79	16.01	267
"Hypermajor" tone	8/7.	10.21	13.87	231
Major tone	9/8.	9.01	12.23	204
Minor tones	10/9.	8.06	10.94	182
	65536/59049	7.97	10.83	180
"Neutral" tones	54/49	7.43	10.09	168
	11/10.	7.29	9.9	165
	800/729	7.11	9.65	161
	12/11.	6.65	9.04	151
	13/12.	6.12	8.31	139
	27/25	5.88	7.99	133
	14/13	5.67	7.7	128
"Least" tones	15/14	5.27	7.17	119
	Apotome	2187/2048	5.02	6.82
Major semitone	16/15	4.93	6.7	112
Pythagorean Lemma	256/243	3.98	5.41	90
Enharmonic semitones	25/24	3.12	4.24	71
	28/27	2.78	3.78	63
"Didymian" comma	81/80	0.95	1.29	22

Table 5. Interval ratios and their values in three arithmetical systems.

Furthermore, the suggestions of Misaelides are 12, 11 and 7 in *tmimata* corresponding to 9, 8 and 5 in Mercatoric commas which are practically identical to the intervals of the *Rast* tetrachord of contemporary Turkish theory⁵⁵. Beginning with the “mild” *diatonic* tetrachords we can observe that the three possible schemes of intervallic arrangement are derived by a cyclical shift of the basic series major tone-minor tone-least tone (equivalent to *Rast* tetrachord)⁵⁶, or 12-10-8 in *tmimata* (9-7-6 in commas). In this manner we get for the other two the orders: minor tone-least tone-major tone (equivalent to *Uşşak*) [10-8-12 in B. T. or 7-6-9 in M. C.] and least tone-major tone-minor tone (8-12-10 in B. T. or 6-9-7 in M. C. equivalent to the Turkish *Segah*). Similarly for the “tense” *diatonic genus* the three schemes are a) Pythagorean *lemma*-major tone-major tone (6-12-12 in B. T. or 4-9-9 in M. C. equivalent to *Kürdi* tetrachord), b) major tone-*lemma*-major tone (12-6-12 in B. T. or 9-4-9 in M. C. equivalent to *Buselik*) and c) major tone-major tone *lemma* (12-12-6 in B. T. or 9-9-4 in M. C. equivalent to *Çargah*).

By contrast, the *chromatic genus* is defined as the one employing intervals larger than the major tone⁵⁷. In the “mild” *chromatic genus* these augmented seconds are smaller than the ones used in the “tense” *chromatic genus*. Karas further elucidated this classification by showing how mild *chromatic* tetrachords derive from the mild *diatonic* ones and tense *chromatic* by tense *diatonic* ones respectively, by means of the change of only one interval⁵⁸. Table 6c contains the committee’s suggestions for the “mild” and “tense” *chromatic* tetrachords, given both in *tmimata* (B. T.) as well as their rough approximations in Mercatoric commas (M. C.), which are more or less still accepted as indicative of the difference between the two *genera*.

B.T.	12	9	7
M.C.	9	6,75	5,25

1st scheme “mild” diatonic suggested by Chrysanthos
(Arithmetic method)

M.C.	9	6,5	6,5
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1st scheme “mild” diatonic suggested by Chrysanthos
(Geometric method)

B.T.	12	11	7
M.C.	9	8	5

1st scheme “mild” diatonic suggested by Misaelides

B.T.	12	10	8
M.C.	9	7	6

1st scheme “mild” diatonic suggested by the “Musical Committee”

Table 6a. The 1st scheme “mild” diatonic tetrachord corresponding to Turkish theory *Rast dörtlüsü*.

B.T.	10	8	12
M.C.	7	6	9

Table 6b. The 2nd scheme “mild” diatonic tetrachord corresponding to Turkish theory’s *Uşşak dörtlüsü* according to the Musical Committee’s intervallic suggestions.

B.T.	6	20	4
M.C.	4	15	3

B.T.	8	14	8
M.C.	6	10	6

Table 6c. “Tense” (upper) and “Mild” (lower) *chromatic* tetrachords as suggested by the “Musical Committee”.

Comparing them with the Turkish *Hicaz* tetrachord we can assume that the distinction between two different types of *chromatic genera* in Byzantine theory pushed both types of tetrachords to the limits, the “tense” one having a very large augmented second while the “mild” a very small one.

In the case of the *enharmonic genus* the situation is somewhat more problematic. In ancient Greek theory this *genus* employed two intervals of the size of a quartertone and one very large augmented second to complete the tetrachord⁵⁹. In this sense the *enharmonic genus* has not fully survived in modern theory. However, practitioners and theoreticians⁶⁰ attest the existence of melodic passages employing intervals smaller than the Pythagorean *lemma* named “enharmonic *dieseis*” or “enharmonic semitones” (approximately 4 *tmimata* or 3 Mercatoric commas) combined with hyper-major (approx. 14 *tmimata* or 10 commas) and major-tones. The resulting tetrachords described in the arithmetic methods consist of combinations of 4, 14 and 12 *tmimata* (3, 10 and 9 in M. C.) in different order. Chrysanthos used such an intervallic configuration to explain 3rd *Echos* (hyper-major tone, enharmonic semitone, major tone)⁶¹ while the Patriarchal “Musical Committee” interpreted the raised *Bov* employed in this case (one comma higher from *Buselik perde*) as a temporary alteration due to melodic attraction existing only in ascending movements⁶². In both cases the particular melodic behaviour was, though, named enharmonic while Misaelides suggested the term *aronikon* (lit. “harmonic”) to underline its partially enharmonic character since it contains only the small intervals and not the large augmented seconds of the ancient enharmonic *genus*⁶³. The distinction between the marginally different arrangements described above and that of the tense *diatonic* configurations (combinations of 4 and 9 commas in different order) has created much confusion⁶⁴. Nowadays the predominant tendency seems to be the utilisation of the term *enharmonic* for specific cases where these particularly small semitones are used to give a temporary *enharmonic* quality such as the raising of *Bov* (*Buselik perde*) towards cadencing on *Γα* (*Çargah*

perde) or the lowering of *Zω* (Acem *perde*) in descending phrases towards *Δι* (*Neva perde*) or the *chroes* which make extensive use of the “enharmonic semitones” as further described in Table 8.

THE GENERAL SCALE OF EACH GENUS AND ITS IMPORTANCE IN PARASEMANTIKI NOTATION

Tetrachords and pentachords, as scale subunits, can be combined in many different ways to construct octave species and even more the *dis-diapason* two-octave species, considered to be the adequate range for such a case of vocal tradition⁶⁵. Even though as we mentioned above, the concept of genera categorization applies better at the level of tetrachords and pentachords, tradition and notational conventions accept one specific two-octave general scale as the default scale for each genus⁶⁶. This means that after an *arktiki martyria* introduces a melody operating in a specific genus, the general scale of that genus serves as the default two-octave intervallic framework on which this melody moves on, until a modulatory sign appears⁶⁷. This is very crucial for this kind of notational system since the quantitative signs here do not carry any information about the intonation of each degree, like in the case of Western staff notation. Thus the ascending and descending movements signified by the quantitative *parasemantiki* signs, are being performed by remaining in the frame of each genus’ general scale. The existence of these general scales for the different *genera* is a very similar concept with the 10 different *Thaat* general scales of Hindustani *Rāga* modal system⁶⁸.

Furthermore the construction of these scales is explained by means of the algorithmic concept of *systemata*, another Ancient Greek idea⁶⁹ emphasized by Chrysanthos⁷⁰. The main initiative behind the modern concept of *systema* (lit. “system”, “method”) is the definition of an algorithm for building up a scale by repeating the same structural unit, one on the top of the other. The three basic *systemata* in modern Byzantine theory are the *tetrachordon* or *triforia* in which the scale is built up by repetition of the same tetrachord, the *pentachordon* or “wheel” where the repeated unit is a pentachord and the *octachordon* or *diapason* in which an octave unit is used. In the latter *systema*, this octave unit is constructed by one major tone and two tetrachords, which are either conjunct with the tone on the top or the bottom, or disjunct with the tone in between⁷¹. Table 7

displays a “mild” diatonic scale constructed in the three different *systemata*, showing the divergence between them. Traditionally, the mild *diatonic genus* develops mainly in the *octachordon systema* creating the celebrated, “basic” or “natural” scale (equivalent to *Rast* scale), which serves as the reference point of the *Octaechia* system; the tense *diatonic genus* follows the *tetrachordon systema* while the mild and tense *chromatic* ones for the most part employ the *pentachordon systema*, although there are exceptions to all these rules.

THE PHENOMENON OF “MELODIC ATTRACTIONS” AND THE PRACTICE OF *ISOKRATIMA*

As a purely vocal tradition that doesn’t hitch on instrument’s fretting, Byzantine chanting presents a very elaborate treatment of the intervals. The theoretically limitless freedom of a vocal rendering in matters of intonation, along with the monotonic structure of this music, have probably been the main reasons for the formation of complicated melodic rules governing the treatment of certain degrees that traditionally are accepted as elastic in intonation. In contemporary theory the phenomenon of “melodic attractions” is being perceived as the result of the attraction of the strong-immovable degrees of the mode on the weak-movable ones⁷².

This relocation of degrees is determined by their intervallic relations with the tonal centres and the cadencing point as well as the direction of each specific melodic phrase, taking of course into account the overall modal environment⁷³. Although Chrysanthos⁷⁴ and Apostolos Konstas⁷⁵ discuss the modification of the intonation of certain degrees depending on the ascending or descending direction of each melodic phrase, the Committee of 1881 was the first to explicitly refer to the phenomenon of “melodic attractions” in the modern era. According to them, “the degrees are divided into two categories, the “dominant” (*despozontes*) and the “surpassable” (*hyperbasimous*), the first of which are stable and the second of which are subject to alterations called “attractions” (*ebxeis*)⁷⁶. The members of the “Musical Committee” that this is a natural phenomenon, which musical practice preserved by passing it orally from one generation to the other, even though the theoretical treatises never analysed it.

<i>δι</i>	<i>κε</i>	<i>ζω</i>	<i>νη</i>	<i>Πα</i>	<i>Βον</i>	<i>Γα</i>	<i>Δι</i>	<i>Κε</i>	<i>Ζω</i>	<i>Νη</i>	<i>Πα'</i>	<i>Βον'</i>
<i>octachordal</i>	12	10	8	12	10	8	12	12	10	8	12	10
<i>pentachordal</i>	10	8	12	12	10	8	12	12	10	8	12	12
<i>tetrachordal</i>	12	10	8	12	10	8	12	10	8	12	10	8

Table 7. The “mild” diatonic *genus* in three *systemata*.

The older generation of Istanbul chanters-theoreticians such as Stefanos Domestichos, Panayiotis Kiltzanides and Apostolos Konstas, who were all acquainted with Ottoman classical music and instruments, tried to explain the phenomenon of “melodic attractions” by specifying the correspondent Ottoman tanbur *nim-perdeler* for the different altered degrees used in typical melodic phrases of Byzantine chanting⁷⁷. Nevertheless, the phenomenon is not restricted to the discrete substitution of a higher degree-*perde* with a lower one but is in fact a continuous bending of a degree in the direction of the melody flow. As an anonymous writer of the past said, “the voices (degrees) are moving, like a flowing river”⁷⁸. Karas stresses that “it is with these slides ... and ornaments that a monophonic music displays its beauty”⁷⁹. Some of the most striking alterations – especially the ones which signal a modulation – are specifically notated in the new *parasemantiki*. Recent scholars aimed to give a more accurate picture of the phenomenon. Karas⁸⁰, Efthimiades⁸¹, and Kostantinou⁸² all try to signify most of the “hidden” attractions by means of the special signs introduced by the “Musical Committee” for sharpening or flattening a note by 2,4,6,8 or 10 *tmimata* (see Table 4 above). This approach, introduced by Psahos at the beginning of the twentieth century⁸³, is still not widely accepted since most teachers and practitioners believe that the old method of relying mostly on oral transmission and not so much on the accuracy of the scores, is superior. The most ambitious among the attempts to investigate the phenomenon of melodic attractions is the book of Katsifis⁸⁴, which deals only with this subject. This author claims that by means of a self-constructed measuring instrument, he confirmed most of these small but important pitch alterations in this music. Taking as reference the standard values for the intervallic relations between the degrees of each mode, he provides long and detailed descriptions of the minute pitch alterations for 17 basic and derivative *echoi*. Another serious endeavour to explicate the possible intervallic arrangements in *diatonic Varys Echos*, a case famous for containing many melodic attractions, was made by Vetsos⁸⁵.

Continuous *ison* or *isokratima* (lit. “drone keeping”) plays a very important role in Byzantine chanting tradition. The main chanter is usually accompanied by one or more *isokrates* or *vastaktes* (drone keepers) while there are cases where a bigger chorus is divided into a group of soloists and a group of *isokrates*. The old tradition of *isokratima* seems to have been based on some simple ideas and even though it is mentioned as playing a very important role in chanting practice, it is not particularly analysed in the old theoretical treatises. It is described as keeping the main tonal centre of the melody which most of the time coincides with the *vasi* (lit. “ground”) reference note of the mode, the bottom end of the lower tetrachord⁸⁶. Nineteenth century brought Western ideas

in drone keeping practice, and the simplicity, solemnity and stability of the old aesthetics was replaced by a much bigger variety and mobility of the *ison* employing ideas from Western harmony. Subsequent scholars reproved these innovations as being unnecessary and irrelevant to this music⁸⁷.

The basic rule of keeping the *ison* at the *vasi* of the *Echos* is contravened at points where the melody insists on notes which are at dissonance with it as well as at points where the melody drops below this *vasi*. At these points the drone follows the melody usually an octave lower (if this is feasible considering the pitch of this degree). A more complete form of *ison* requires a second drone, which shows a slightly higher mobility following or reflecting the temporary shifts of the melodic centre⁸⁸. The *vasi* drone is dropped completely or substituted in modulations that change the reference note. At this point lies one of the most important roles of the continuous drone presence in this music. This judiciously movable drone is responsible for presaging as well as preparing the ground for all modal variations. From the most imperceptible to the most distinct modulations, they all rely upon drone support to create the appropriate atmosphere to justify their existence. The humble art of the *isokratis* in Byzantine chant consists of his preparedness to foreshadow all these nuances of this music. This is managed by his looking forward in the score for these alterations and being ready to underline them -in cases where notation is used- or by remembering every one of them in situations where chant is performed by heart⁸⁹. One of the important features of this movable drone is the fact that it triggers as well as supports and justifies the above mentioned melodic attractions, which under the presence of *isokratima* seem to arise as a result of “natural harmony”⁹⁰.

RHYTHM AND FORM

The idiomorphic phenomenon of “tonic rhythm”, used in Byzantine chant, derives from the dominance of the poetic text on music setting, as stated above. As a result there are no standard repeated rhythmic patterns functioning as the frames of compositions. Instead of the ordinary organization of time in cycles, the dynamic emphasis of the melody follows the accentuation of the text. At certain parts the chanting follows a stable tempo, and metres of 2, 3, 4 time units (among which the 4 beat cycle is the one most frequently found) succeed one another in a manner that depends entirely on the metric schemes of the poetic text⁹¹. Chrysanthos’s introduction of bar metres⁹² along with the accurate specification of the time duration of signs followed by the “Musical Committee(s)” metronomic specification of tempo, contributed to the raising of the old method’s rhythmic obscurity commented upon by Cantemir in his theoretical treatise⁹³.

Morphological analysis consists of a classification of the compositions in *eidei* (*eidos* lit. “kind”, “genre”), according to the type of the hymn, its performance tempo and the number of time units each syllable of the text occupies. *Eirmologikon eidos* - the most ancient one - is the category of compositions in which whole groups of hymns share the same melody, and it contains short pieces played in fast tempo where each syllable extends for 1 or 2 time units. By contrast in *sticherarikon eidos* compositions are all unique mostly containing the “moderately short” pieces where each syllable extends for 2 up to 4 time units (in the case of old *sticherarikon* it can reach up to 8). The *papadikon eidos*, being the last developed, consists of slow compositions in which the syllables of the text cover a large number of time units. The interpretation of such compositions traditionally allows considerable freedom for the performer both in matters of temporal as well as melodic analysis of the phrases⁹⁴.

Although *eidos* is not a modal characteristic, it plays an important role in the modal behaviour of a chant. For most *echoi*, the modal characteristics are quite different, depending on the *eidos* of the chant. In that sense the categorization in *echoi*, which will be presented below, is not based only on modal criteria but also on morphological, which in turn depend on the content and metric form of the poetic text, as well as the tempo of its usual performance. Thus the organization in eight *echoi*, named as *Octoechos* or *Octaechia*, is not strictly a modal system like the case of Arabic and Turkish *Makams* or the Indian *Rāgas*, but rather a “semi-modal” organization of the repertoire, like the *Dastgah* system of the Persian classical music⁹⁵.

THE “SEMI-MODAL” COMPLEX OF OCTOECHIA AND THE CONSTITUTIVE CHARACTERISTICS OF ITS ENTITIES

The old form of *Octoechos* was an original descendant of the ancient hierarchical and symmetrical closed-ended modal systems tradition⁹⁶ of the great civilizations that flourished in the area between Eastern Mediterranean, Central Asia and the Indian subcontinent⁹⁷. The structure of *Octoechos* complex, having a set of “primary” and a set of *plagal* (lit. “oblique”, “collateral”) “subordinate” *echoi*, is similar to the structure of the old eastern modal systems, such as the 7 “royal” modes of the Persian system of the Sassanid era, the eight modes of the Arabic system of the Umayyad era⁹⁸, the post- Ibn Sina (10th C.) series of 12-mode modal systems named as *Shed*, *Pardah*, *Makam* or *Naghmah* (*primary modes*) and *Avaż*, *Sho'ba*, *Gushe* (secondary subordinate modes), or even the Indian system of 6 primary *Rāgas* each one having 5 subordinate *Rāginis*⁹⁹.

The theoretical model of the generation of the *echoi* and their relative position on the “basic” scale is of vital importance in understanding the structure of the *Octoechos* complex. The original position of the 4 *kyrioi* (primary) *echoi* in the old *Octoechos* was on the upper tetrachord *Kε-IIα'* of the “basic” scale¹⁰⁰ while the corresponding *plagal* ones were placed a fifth lower on the tetrachord *Ια-Δι*. Consequently the numbering of the *plagal echoi* would start from the first degree of the “basic” scale *νη* while that of the *kyrioi echoi* a fifth higher from *Δι*, both developing along the notes of the basic *diatonic* tetrachordal configuration major tone-minor tone-least tone-major tone (corr. *Rast* pentachord)¹⁰¹. Therefore, the *vast-finalis* of the four primary *echoi* were *Kε* (1st *Echos*), *Zω* (2nd), *Νη* (3rd), *Ια'* (4th), *Ια* (1st *plagal*), *Bοv* (2nd *plagal*), *Γα* (3rd *plagal*), *Δι* (4th *plagal*)¹⁰².

A series of reasons were responsible for the rearrangement of this scheme whose transformation resulted in the configuration first introduced by Chrysanthos in his theoretical treatises. As was the case for many perfectly symmetrical modal systems produced in the history of Middle Eastern music theory, practice did not always obey these models. Due to difficulties in performing the compositions in the high register, the *vasi* of the 4th, 3rd, and *plagal* of 4th were transposed a fifth lower on *Δι* (*Neva perde*), *Γα* (*Çargah perde*) and *Νη* (*Rast perde*) respectively¹⁰³. For a strictly vocal tradition where instruments were only used as pedagogical and research tools, the absolute pitch of a performance did not have the same meaning and importance as in instrumental genres. Moreover the above-mentioned “transpositions” of the *vaseis* of these *echoi* were also dictated by the austere and solemn aesthetics of this music¹⁰⁴. Another factor that seems to have influenced the relative positions of the modal entities of the *Octoechos* complex is the long interaction of Byzantine chant with Ottoman-Turkish classical music and its instruments, which played an exceptional role as teaching-researching aid in the hands of many of the leading chanters and theoreticians in the history of this music. It is most probable thus to consider the transposition of the modes 1st, 2nd and *plagal* of 2nd to fit the *finalis* of the corresponding *Makams* (*Uşşak*, *Hiz zam*, *Hicaz*, respectively¹⁰⁵) as an indirect result of this interaction.

Besides these rearrangements of the basic organization scheme of 4 *kyrioi*-4 *plagal echoi*, the contemporary *Octoechos* complex distinguishes the different modal morphemes into a big number of distinct cases based on a series of modal structural characteristics which are similar to the corresponding ones found in Turkish and Arabic *Makams*, Persian *Dastgah* or Hindustani *Rāgas*. Thereby, the scheme is devised in many types of derivative *echoi*, depending on complicated modal behaviour reminiscent of the *Seyir* (melodic progression¹⁰⁶) of composite *Makams*, producing the so-called *mesoi*, *parmesoi*, or *difonoi*, *trifonoi*, *tetrafonoi*,

pentafonoi etc. *echoi*. According to Apostolos Konstas Chios, these subordinate branches of the main *echoi*, reached the total number of distinguishable modal entities of Octoechos to 90¹⁰⁷.

Contemporary theory analyzes *echoi* by means of some basic characteristics. The *vasi* is the first one of them, which is considered as the degree of the “basic” scale that “generates” the specific *Echos*, normally playing the role of the basic reference-drone as well as that of the finalis of the *Echos*. The scale employed, the *genus*, in which it belongs and the *systema* by means of which this scale is constructed, are the next aspects characterizing an *Echos*. The hierarchy of the degrees of the mode – a crucial feature of the system – is based on two concepts, firstly their temporal dominance and secondly their role as cadential stops. *Despozouses* (lit. “dominant degrees”) are the notes that are distinguishable due to their frequency of appearance as well as their relative duration. *Katalixeis* (cadential stops) are the degrees on which the particular *Echos* prefers to rest. In most cases the *despozouses* coincide with some of the prominent *katalixeis* of the *Echos*. Byzantine theory distinguishes between three types of stops depending on the importance, duration and position of the specific cadence in the progression of the melody. In this manner we have *ateleis*, *enteleis* and *telikes katalixeis* meaning “provisional”, “intermediary” and “final” stops respectively, in full correspondence with the punctuation of the text by means of comma, semicolon and full stop. For each one of these types of *katalixeis* there are characteristic melodic phrases cadencing on these degrees, called *theseis*, which are typical for each *Echos*¹⁰⁸. Panagiotopoulos presents extended catalogues of such *theseis* for each *Echos* and its most common derivatives¹⁰⁹.

Important elements of an *Echos* are the signifying *arktiki martyria* (already explained above), the *apechema*, the distinctive “melodic attractions” happening in the framework of the specific mode, the ordinary ambitus as well as the typical modulations of the specific *Echos*. *Apechema* (pl. *apechemata*), which is automatically performed by the chanters even though not included in the scores, is a short introductory melody serving to create the appropriate modal atmosphere before the performance of the composition begins¹¹⁰. Nowadays the *apechemata* have become very short, though most contemporary theory books include their long versions of the “old method”¹¹¹. The *ethos* is usually discussed last by all the authors, since it is not a technical aspect of the melody, but more of a way of describing its characteristic atmosphere. Although three general types of *ethos* are accepted – identical with those referred by Cleonides¹¹² – the *diastaltiko* (“dilating” or “elevating”) the *systaltiko* (“contracting” or “depressing”) and the *hesyastikos* (“calming” or “soothing”), the case of each *Echos* is portrayed by means of a more descriptive terminology¹¹³.

A CONCISE PRESENTATION OF THE MAIN ENTITIES OF OCTOECHOS¹¹⁴

1st *Echos*¹¹⁵

Its *vasi* is $\Pi\alpha$ for the case called “inner”, and $K\varepsilon$ for the case called “outer”. Both use the mild *diatonic* scale developing in the *octachordon systema*, consisting of two disjunct tetrachords of the type minor-least-major tone, even though in some instances the *pentachordon systema* is also employed. In the case of *eirmologikos* “inner” 1st *Echos* the dominant degrees (*despozontes*) are $\Pi\alpha$ and Δi and the provisional stops (*ateleis katalixeis*) are on Δi and $\zeta\omega$ while the intermediary and final stops (*enteleis* and *telikes katalixeis* respectively) are made on $\Pi\alpha$. For *sticherarikos* “inner” 1st *Echos*, dominant degrees are $\Pi\alpha$ and $\Gamma\alpha$, provisional stops on $\Gamma\alpha$ and Δi and intermediary and final stops on $\Pi\alpha$. *Papadikos* “inner” 1st *Echos* uses $\Pi\alpha$, $\Gamma\alpha$, Δi , $K\varepsilon$, $\Pi\alpha'$ as dominant degrees, provisional stops on $\Pi\alpha$, $\Gamma\alpha$, Δi , $K\varepsilon$ and intermediary stops on $\Pi\alpha$, Δi , $K\varepsilon$ and final on $\Pi\alpha$. In the case of “outer” 1st *Echos* with *vasi* on $K\varepsilon$ we have dominant degrees on $K\varepsilon$ and $N\eta$, provisional stops on $\Pi\alpha$, $\Gamma\alpha$, Δi , $K\varepsilon$, $N\eta$ *enteleis* on $\Pi\alpha$ and *telikes* on $K\varepsilon$. Explicitly referred to is the case insisting on $\Gamma\alpha$ while lowering Δi , named 1st *Echos* *diphonos* or “naos” or “pathetikos”. Among the usual modulations are the *kliton* and the tense *chromatic* on $\Pi\alpha$. In Ottoman-Turkish *Makam* language we could say that “inner” 1st *Echos* corresponds to the *Uşşak-Beyati* family, including as its different cases *Neva*, *Isfahan* or *Saba* as well. The case of “outer” 1st *Echos* on $K\varepsilon$, though, is like a *Hüseyini* ending on the homonymous *perde*.

2nd *Echos*¹¹⁶

Two different branches can be distinguished in the case of this *Echos*, the first employing the mild and the second the tense *chromatic* scales, both built by means of the *pentachordon systema*. The first is used in the *sticherarikon* and *papadikon eidos* while the second in the *eirmologikon*, even though there are alternations between the two. The mild *chromatic* 2nd *Echos* uses Δi as its *vasi*, *Bov* and Δi as its dominant degrees, Δi , *Bov*, $Z\omega$ and $N\eta$ and as its provisional stops, *Bov* and Δi as its intermediary ones and mainly Δi but also *Bov* as its finalis (in the latter case it is named *mesos* of the 2nd). For the tense *chromatic* case, which actually behaves as a 2nd *plagal Echos* (see below), the *vasi* is $\Pi\alpha$, the dominant degrees are $\Pi\alpha$ and Δi , and provisional stops are always made on Δi while intermediary and final ones on $\Pi\alpha$. The mild *chromatic* – i.e., the 2nd *Echos* – is related to *Makam Hüzzam* though its final cadence is more often on Δi (*Neva*) than on *Bov* (*Segah perde*). Furthermore, whenever the latter mode descends to $\nu\eta$ (*Rast perde*) another mild *chromatic* pentachord is employed from $\nu\eta$ to Δi . A derivative *Echos*

combining the 1st and mild *chromatic* 2nd *echoi* is the one called *defteroprotos* which is very similar to *Makam Karcigar*.

3rd *Echos*¹¹⁷

This *Echos* has $\Gamma\alpha$ (*Çargah perde*) as its *vasi* and develops mostly on the tense *diatonic genus* working in the tetrachordon *systema*, although it follows the mild *diatonic genus* at certain points of its melodic progression. For the *eirmologikon* and *sticherarikon eidos* dominant degrees are $\Pi\alpha$, $\Gamma\alpha$ and $K\epsilon$, provisional and intermediate stops are made on $\Pi\alpha$ and $K\epsilon$ and final ones on $\Gamma\alpha$. From the point of view of *Makam* theory this *Echos* resembles the theoretical *Çargah Makam* introduced by the Ezgi-Arel system; it is also reminiscent of the *Acem Aşiran* melodic atmosphere. The case of 3rd *Echos* in *Papadikon eidos* follows the melodic characteristics of 4th plagal, as this will be explained below.

4th *Echos*¹¹⁸

Three considerably different cases are grouped under this name, all of which develop in the mild *diatonic scale* in the *octachordon systema*, though a large number of melodic attractions take place in them. Firstly the one called *eirmologikos* or *leytos* (equivalent to *Segah Makam*), which has as its *vasi* the degree *Bov*, while its dominant degrees are *Bov* and Δi , its provisional stops are made on $\Pi\alpha$, *Bov* and Δi and its intermediary and final ones on *Bov*. The case of *sticherarikon* is considered to have $\Pi\alpha$ as its *vasi* though its final stops are mostly on *Bov* (though older compositions used $\Pi\alpha$ as their *finalis*). It is a combination of *Leytos* with the 1st *Echos* and therefore can be paralleled with *Segah Maye Makam*. The latter case has $\Pi\alpha$, *Bov* and Δi as its dominant degrees, *Bov* and Δi as its provisional stops while the intermediary stops are made on $\Pi\alpha$. The third case is *papadikon eidos*, which has the special name *Aghia*. Having Δi as its *vasi* and *finalis*, it is famous for employing a large number of melodic attractions that affect the intonation of all the degrees except Δi . Dominant degrees in this case are Δi , $Z\omega$, $\Pi\alpha'$ while the provisional stops are made on $Z\omega$ and $\Pi\alpha'$ and occasionally also on *Bov*, $\Pi\alpha$ and $N\eta$ and the intermediary ones on Δi , $\Pi\alpha'$. We could interpret it is a combination of an old form of *Makam Neva* concluding on the homonymous *perde* with *Makams Eviç* and *İsfahan*, while occasionally using *Segah* and *Müstear* as well.

Plagal 1st *Echos*¹¹⁹

This is another typical mild *diatonic Echos*. The *eirmologikos* case has its *vasi* on $K\epsilon$, dominant degrees the $K\epsilon$ and $N\eta$, provisional stops on $N\eta$ and $\Pi\alpha'$ and intermediary and final ones on $K\epsilon$. It is important to note the lowering of $\Pi\alpha'$ when the melody is developing

around $N\eta$. We could parallel this mode with a combination of a *Hüseyni* with a *Saba* transposed on *Hüseyri* having as its *finalis* the homonymous *perde*. The *Sticherarikos* or 1st plagal trifonon is rather different from the former with *vasi* on $\Pi\alpha$, dominant degrees the $\Pi\alpha$, Δi and $K\epsilon$ while the provisional stops are on Δi , and $K\epsilon$, intermediary on $\Pi\alpha$ and final on Δi though at the very end of a series of musical sections in this mode, the final cadence has to be on $\Pi\alpha$. The cadences on Δi employing $Z\omega$ flat and $\Gamma\alpha$ sharp make this resemble a combination of *Hüseyri Makam* with *Buselik* transposed on *Neva perde*. Finally the *papadikos* plagal 1st *Echos* shares the same *vasi* and *finalis* with the *sticherarikos* but its dominant and cadencing degrees are different. The former are the $\Pi\alpha$, $\Gamma\alpha$, Δi and $K\epsilon$ whereas the provisional stops are on $\Gamma\alpha$, Δi and $K\epsilon$ and the intermediary ones are on Δi and $K\epsilon$. This mode very much resembles *Makam Hüseyni*. Other interesting derivative branches of this *Echos* are the so-called plagal 1st *pentafonos* equivalent to *Makam Acem* or the famous cases using tense *diatonic scales* corresponding to *Makams Buselik* and *Kürdi*.

Plagal 2nd *Echos*¹²⁰

This *Echos* employs the tense *chromatic scale* developing in the *pentachordon* and *octachordon systemata* except in the case of *eirmologikon eidos* where it works like the 2nd *Echos* in the soft *chromatic genus*. In the cases following the tense *chromatic genus* - being equivalent to *Hicaz* family of *Makams* - such as compositions in slow *sticherarikon* or in *papadikon eidos*, the *vasi* is $\Pi\alpha$, dominant degrees coincide with the provisional stops which are made on $\Pi\alpha$, Δi and $K\epsilon$, whereas the intermediary and final ones are always made on $\Pi\alpha$. An interesting case is that of *Nenano*, having as its dominant degrees Δi , $Z\omega$ and $\Pi\alpha'$, provisional stops on $Z\omega$, and $\Pi\alpha'$ and *enteleis* and *telikes* on Δi , functioning as a combination of plagal 2nd with 4th *Echos aghia*.

Varys *Echos*¹²¹

This is the largest group of modal entities codified under the name of one *Echos* in this system. It employs both mild (in *octachordon systema*) and tense *diatonic* (in *tetrachordon systema*) scales accompanied by a big variety of melodic attractions. To categorize these modal entities we take into consideration the three possible *Vaseis*, which are $\Gamma\alpha$, $\zeta\omega$ natural and $\zeta\omega$ flat. The first case having $\Gamma\alpha$ as its *vasi* and final stop, is very close to 3rd *Echos*, though its intermediate stops ($\Gamma\alpha$, Δi , $\Pi\alpha$, $N\eta$) and dominant degrees ($\Gamma\alpha$, Δi , $N\eta$ and $Z\omega$ flat) are slightly different. The so-called *Varys enharmonios* has $\zeta\omega$ flat (*Acem Aşiran perde*) as its *vasi* while being the actual plagal of the 3rd *Echos* it employs a tense *diatonic scale* using two disjunct tetrachords of the type major tone-major tone-*lemma* starting from $\zeta\omega$ flat. In *Makam*

language this mode is the equivalent of *Acem Aşiran Makam*. The third case is the most polymorphous one employing a big variety of provisional and intermediary stops on $\zeta\omega$, $\Pi\alpha$, $\Gamma\alpha$, $\Delta\iota$, $Z\omega$ virtually corresponding to several *Makams* such as *Irak*, *Evic*, *Bestengar*, *Rahatulervah* etc. all sharing $\zeta\omega$ natural (*Irak perde*) as their finalis. Of particular interest is a case of the latter group using as its main tonal centre the fifth of the *vasi* $\Gamma\alpha$ sharp (*Hicaz perde*).

Plagal 4th Echos ¹²²

This is a group of modal entities having as its *vasi* the starting point of the “basic” scale $v\eta$. The most important case of plagal 4th is in the mild *diatonic* scale having as its dominant degrees $v\eta$, *Bov* and $\Delta\iota$, its provisional stops on $v\eta$, *Bov*, $\Delta\iota$, $\delta\iota$ and $\Pi\alpha$, intermediary ones on $v\eta$ and $\Delta\iota$ and finalis on $v\eta$, this being directly equivalent to *Rast Makam*. There are many derivative modes of the one described above, such as the *difonos*, or cases employing mild or tense *chromatic* scales or tense *diatonic* ones corresponding to various *Makams* such as *Sazkar*, *Nikriz*, *Suzinak*, *Nihavend*, *Hicazkar* etc. all having as their finalis *Rast perde*. The case of *eirmologikos* 4th plagal *Echos* behaves as a transposition of the above mode on $\Gamma\alpha$.

MODULATION AND THE TOOLS OF *FTHORES* AND *CHROES*

Since ancient times the term *chroa* (lit. “color”, “shade”) was used to specify any kind of different division of tetrachords and scales other than the standard ones of the *diatonic*, *chromatic* and *enharmonic genera*. In this manner Chrysanthos gives an algorithm of producing *chroes* by systematic alteration of the degrees of the *diatonic* scale, ending up with 740 different combinations¹²³. Karas defines *chroes* as “specific subdivisions of the *genera*”¹²⁴, i.e. the *chroes* of “mild” and “tense” *diatonic* as well as those of the “mild” and “tense” *chromatic*. Among the innovations introduced by the reform of 1814 were three symbols (parts of the set of *fthores*) with a specific modulating function¹²⁵, which were named by the Committee of 1881 as the “three *chroes*”. According to Karas this usage of the term *chroa* is incorrect, introduced only to explain *Makams Nişabur*, *Hisar* and *Müstear*¹²⁶. Nevertheless these three *chroes* are widely accepted in contemporary theory¹²⁷ and as analytical tools have an interesting difference from the much broadly used tetrachords and pentachords. Instead of functioning as independent scale subunits, they are placed at a certain degree of the “basic” scale, which is thereafter their tonal centre, having the effect of polarizing its neighbouring degrees by altering their intervallic relations in a certain manner. Table 8 depicts this polarizing effect for each one of them.

Metavole (modulation) has already been mentioned by ancient Greek theorists, as one of the important aspects of *melos* (melody)¹²⁸. Chrysanthos explains the necessity of *metavole* as the basic means to avoid monotony and tediousness¹²⁹. Modal variety and modulation are crucial tools for attaining the above mentioned goal of underlining the meaning and religious messages of the poetic text. Panagiotopoulos shows how several typical text meanings are underlined by using “mild” or “tense” *chromatic genera*¹³⁰. An interesting aspect of the Byzantine theoretical model is the systematized analysis of modulation developed in the modern period. Contemporary standard theory texts distinguish between three main mechanisms of modulation, *metathesis* or “tone modulation” where the modulation leads to a transposition while remaining in the same *genus*, “modulation by genus” where we have a change of *genus* without any transposition and *parahordi* which is a combination of the first two¹³¹. These modulations are indicated by the *fthores*, the 13 signs established by the three reformers of 1814. Apart from the \circ which is also used for flattening a degree, the other 12 do not affect the intonation of the specific degree but alter its role. To explain this mechanism we first need to present these 13 *fthores* and the implications of their appearance at a certain point of a music score. Eight of these signs are used for the degrees of the “mild” *diatonic* scale starting from $N\eta$ (*Rast perde*) and ranging up to upper $N\eta'$ (*Gerdaniye perde*) as shown in the diagram below. The next four are for the “mild” and “tense” *chromatic genera*, serving alternatively as the *fthores* of all the degrees of the two *chromatic* scales. In their case, the first letter of the corresponding solmisation syllable accompanies the sign of the *fthora* wherever the exact degree needs to be specified. The function of the *fthores* (except \circ) is to transform the specific note to a degree of another scale as pointed out by the sign. Table 9 below shows all 13 *fthores* for each particular *genus* or *chroa* along with the specific degree it is employed to signify¹³².

For example, if the chant is using the “mild” *diatonic* scale and the “mild” *chromatic fthora* of $\Delta\iota$ (*Neva perde*) is placed on $\Delta\iota$ itself, this means that the specific degree is transformed to a $\Delta\iota$ of a “mild” *chromatic* scale. From this point on we have the so-called *desis* (lit. “tying”) of the melody, which continues as a *fthorikon melos* (lit. “modulated melody”) in the *chromatic genus* until another *fthora* changes the situation again.

CONCLUSIONS

Istanbul was the main centre where the development of Orthodox chanting in both the Byzantine and Ottoman Empires took place. The interaction of this chanting practice with other musical idioms sharing the same multicultural environment is obvious in their affinity on both a practical, as well as theoretical level.

On the level of notational system, a very important characteristic of the *parasemantiki* notational system, even in its contemporary analytical version, is the fact that it assumes a high level of proficiency by the prospective reader and thus it does not contain much of the information needed to perform these scores. This is also true for all notational systems used to depict Near and Middle Eastern modal monophonic music- the reason being mainly the exceptional elaboration of its single melodic line. The fact that this elaboration consists of details in intonation, rhythm, ornamentation, phrase analysis and style, restrains the role of notation; the latter takes then the role of a mnemonic code and consequently these traditions come to rely mostly on oral transmission.

One of the main concerns of scholars attempting to theorize the Byzantine chanting tradition has been to propose euphonic combinations of epimoric or small number ratios for the amazing variety of intervals implied by the phenomena of *genera* and ‘melodic attractions’- a strategy that sits well within the ancient Greek as well as Arabic musicological legacy. Nevertheless, until scientifically confirmed, the only thing this abundance of possible natural intervals proves is the range of potential choices for a musician to express himself through minute variations in intonation.

Although the contemporary Orthodox chanting practice seems to be influenced by Near and Middle

Eastern music idioms, even the present-day structure of its *Octoechos* system presents a high affinity with the ancient Greek equivalent. Concepts such as tetrachords and pentachords, *genus*, *systema*, general scale of a *genus*, “melodic attractions”, *chroes*, the rules of *metavole*, the theory of *ethos*, as well as the mathematical description of intervals, all derive from ancient Greek music theory. Even if the elegance and perfect symmetry of the hierarchical and partly closed-ended old system of eight *echoi* was disturbed by the reforms of 1814, the contemporary system still maintains the structural characteristics and the philosophy of the old one. Furthermore, the embroilment of morphological and textual criteria in the categorization of *echoi* makes the *Octoechos* system a peculiar “semi-modal” complex, differing considerably from the Ottoman-Turkish and Arabic versions of the *Makam* modal system.

Modern theoretical and notational systems of Byzantine chanting tradition exhibit an impressive variety of analytical and methodological tools, which even though they align with the general philosophy and aesthetics of their counterparts of the great Near and Middle Eastern music traditions, at the same time they present a different perspective in the endeavor to understand, explain and depict similar musical phenomena.

vη	Πα	Βον	Γα	Δι	Κε	Ζω	Νη	Πα
12 (9)	10 (7)	8 (6)	12 (9)	12 (9)	10 (7)	8 (6)	12 (9)	12 (9)
	14 (10)		12 (9)	4(3)				
Kliton								
vη	Πα	Βον	Γα	Δι	Κε	Ζω	Νη	Πα
12 (9)	10 (7)	8 (6)	12 (9)	12 (9)	10 (7)	8 (6)	12 (9)	12 (9)
18 (13)	4(3)		16 (12)	4(3)				
Zygos								
vη	Πα	Βον	Γα	Δι	Κε	Ζω	Νη	Πα
12 (9)	10 (7)	8 (6)	12 (9)	12 (9)	10	8	12	12
			20 (15)	4(3) 4(3)	14 (10)			
Spathi								

Table 8. The three *Chroes* and their effect on the Fundamental scale.¹³³

Fthores and Chroes								
	vη	Πα	Βον	Γα	Δι	Κε	Ζω	Νη
"Mild" Diatonic	ꝝ	ꝝ	ꝝ	ꝝ	ꝝ	ꝝ	ꝝ	ꝝ
"Mild" chromatic	ꝝ	ꝝ	ꝝ	ꝝ	ꝝ	ꝝ	ꝝ	ꝝ
"Tense" chromatic	ꝝ	ꝝ	ꝝ	ꝝ	ꝝ	ꝝ	ꝝ	ꝝ
Enharmonic								
Zygos			ꝝ	ꝝ				
Kliton					ꝝ			
Spathi					-ꝝ		-ꝝ	

Table 9. *Fthores and chroes*.

Glossary

- Apechema* ⇒ Introductory melody typical for each mode.
- Ateleis Katalixeis* ⇒ see *Katalixeis* below.
- Avaz* (part of vocal repertory of Persian classical music) ⇒ Free non-metric vocal form following the metric structure of poetic text.
- Avaz* (part of Modal complex of *Dastgah-Avaz*) ⇒ Secondary group of modal and morphological entities of Persian classical music *Radif*.
- Çesni* ⇒ Colour or flavor or atmosphere of a certain *Makam* usually as a temporal modulation (Turkish system).
- Chroa* (pl. *chroes*) ⇒ Specific modal nucleus defined around a tonal centre, having a particular polarizing effect on the adjacent degrees around this centre.
- Chromatic* ⇒ Modal unit employing augmented seconds.
- Despozousa* ⇒ Dominant degree (not necessarily the fifth like in western music).
- Diatonic ('mild')* ⇒ Modal unit employing all types of tones (including neutral) as well as major semitones (see Table 2).
- Diatonic ('tense')* ⇒ Modal unit employing only major tones and Pythagorean lemmas (see Table 2).
- Dörtlüsi* ⇒ Tetrachord (Turkish system).
- Dastgah* system ⇒ An organization of the *Radif* repertoire in 12 categories 7 *Dastgah* and 5 *Avaz*.
- Echos* (pl. *echoi*) ⇒ The modal entities of the Octoechos complex.
- Eidos* Morphological classification of compositions.
- Eirmologikos* ⇒ The syllabic *eidos* where each syllable of the text covers 1-2 time units, the tempo is fast and whole groups of hymns share the same melody.
- Enharmonic* intervals ⇒ Intervals smaller than the Pythagorean *lemma*.
- Enharmonic genus* ⇒ The *genus* employing enharmonic intervals (see Table 2).
- Entaleis Katalixeis* ⇒ see *Katalixeis* below.
- Fthores* ⇒ Sings serving to signify modulations.
- Genus* (pl. *Genera*) ⇒ A modal class employing the same types of intervals.
- Giriş* ⇒ Opening degree i.e. the first cadential stop of a melody (Turkish system).
- Giçili* ⇒ Dominant degree (Turkish system).
- Isokrates* ⇒ Drone keeper.
- Ison* (or *Isokratema*) ⇒ Drone.
- Karar* ⇒ Finalis (Turkish system).
- Katalixeis* ⇒ Cadential stops devided in three types ⇒ *ateleis* (provisional), *enteleis* (intermediate) and *telikes* (final).
- Kliton* ⇒ *Chroa* corresponding to Turkish *Nişabur çesni*.
- Martyria (arktiki)* of an *Echos* ⇒ Symbol put at the beginning of a score to specify the mode of a chant.
- Martyries* of degrees ⇒ Special signs (depending on the *genus*) employed to signify the specific degree of a scale.
- Melodic attractions ⇒ Alterations in the intonation of certain degrees depending on a complicated system of laws relying mostly on oral tradition.
- Metavole* ⇒ Modulation.
- Mild (diatonic or chromatic) ⇒ see endnote n° 52.
- Nim-perdeler* ⇒ In contrast with *tam-perdeler* (the degrees of the fundamental scale), *nim-perdeler* are the altered degrees which are intonated higher or lower from the *tam* (main) degrees, exactly corresponding to the "fithorikes" of the Byzantine system.
- Paralagi* ⇒ The practice of singing the melody using solmisation syllables equivalent to Western *solfège*.
- Octoechos* or *Octaechia* ⇒ An organization of the Byzantine chanting repertoire in 8 categories based mainly on modal but also on morphological and textual characteristics.
- Parasemantiki* ⇒ The notational system in both ancient Greek and Byzantine terminology.
- Perde* ⇒ Fret as well as degree in the Turkish system such as the *Rast*, *Diğah*, *Segah*, *Çargah*, *Neva*, *Hüseyini*, *Eviç*, *Gerdanye*, *Muhayyer* etc of the Turkish fundamental scale.
- Papadikon* ⇒ The slow and melismatic *eidos*, in which the syllables of the text cover a large number of time units.
- Radif* ⇒ The repertoire of classical Persian music.
- Raga* ⇒ Modal entity of the Hindustani (North-Indian) classical music modal system *Seyir* ⇒ "Scenario" of the melodic progression of a certain *Makam* (Turkish system).
- Spathi* ⇒ *Chroa* corresponding to Turkish *Hisar çesni*.
- Sticherarikon* ⇒ The *eidos* containing the "moderately short" pieces where each syllable covers 2 up to 4 time units (in the case of old *sticherarikon* it can reach up to 8).
- Systema* ⇒ Method of constructing scales by repeating the same modal unit.
- Tense ⇒ (diatonic or chromatic) see endnote n° 52.
- Tmima* (pl. *Tmimata*) or *dodekatimoria* ⇒ measurement unit to specify the size of an interval, considered to be 1/72th of an octave.
- Thaat* ⇒ Scale type of Indian classical music *Raga* modal system
- Tonic rhythm ⇒ Rhythm that follows the metric structure of the poetic text.
- Vasi* ⇒ Finalis of an *Echos*.
- Zygos* ⇒ *Chroa* corresponding to Turkish *Müstear çesni*.

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Notes

¹ The present work is an updated version of material presented in my Master's Thesis; it also contains material prepared for the (unpublished until today) volume *Music in the Mediterranean, Modal classical traditions, Vol. 2 Theory and Practice* (Feldman,W. & Guettat, M. & Kerbage, T. eds.) which was planned in the frame of *Medimuses* project undertaken by the organization En Chordais.

² The current presentation analyzes the main aspects of this tradition while also trying to foreground the parallels between its methodological tools and Near Eastern musicology, and in particular Ottoman-Turkish theory; such a methodological choice nevertheless follows a well established tradition of comparativism between these two discourses mainly expressed by Panayiotis Chalatzoglou, Kyrilos Marmarinos, Stefanos Domestichos, Apostolos Konstas Chios, Konstantinos Protopsaltis and Panayiotis Kilzanidēs (see [Popescu-Judetz et al., 2000 ; Apostolopoulos, 2002; Stephanos (Domestichos), 1843 ; Konstantinos (Protopsaltis), 1843 ; Kilzanidēs, 1991]).

³ [Talāī, under publication, p. 12-14]: all the particular musicological terms used in this article are explained in the attached glossary.

⁴ Reminiscent of the *Dastgah* organization of Persian classical music *radif*.

⁵ Musical sources from this period consist of a large number of theoretical treatises starting with Chrysanthos's *Introduction* [1821], numerous collections of transcribed music as well as recordings from as far back as the beginning of the twentieth century. In the 19th C., at least 60 theoretical discourses were published, while the beginning of the 20th C. coincides with an expansion in the number of musical publications and the appearance of the first musicological periodicals focusing on Byzantine chant (*Formynx, Musiki, Ecclesiastiki Alithia*). By the end of the century, with the contribution of Western musicological research, the bibliography dealing with Byzantine music had reached some 1000 titles.

⁶ From this point "parasemantiki".

⁷ See [Stathis, 1992, v. 1, p. § 3.4].

⁸ See [Papadopoulos, 1977, p. 312; Rōmanou, 1985, p. 8-9].

⁹ A key figure in Post-Byzantine Orthodox chant who was given the nickname *Hirsiz* (lit. "thief"), as he had developed an elaborate system which made him capable of immediately transcribing melodies (see [Papadopoulos, 1977, p. 321]).

¹⁰ See [Psachos, 1978, p. 65-95].

¹¹ It is worth mentioning here that Chrysanthos's first application of the "new analytical method" in teaching caused his "exile" to his birthplace Madytos. According to Papadopoulos [1977, p. 333], he was immediately recalled when the Patriarchate became convinced of the efficiency of his teaching method.

¹² See [Rōmanou, 1985, p. 20].

¹³ See [Alygizakis, 1985, p. 198 ; Stathis, 1972, p. 423].

¹⁴ In this article we chose to use a straight forward transliteration from Greek to English based on modern Greek pronunciation (for example *fthores* instead of *phthores* and *Kointilianos* instead of *Quintilianus*).

¹⁵ See [Stathis, 1972, p. 423].

¹⁶ See Chalatzoglou (in [Popescu-Judetz et al., 2000, p. 35]) & [Kilzanidēs, 1991, p. 17].

¹⁷ An analogous non-mathematical time interpretation stands for the long and short temporal values in Persian classical music (see [Talāī, under publication]).

¹⁸ *Fthores* are another important aspect of this system, which mainly serve to signify modulations by means of alterations of the scale, *genus* or *systema* of a composition (see below in text).

¹⁹ The latter scheme interprets *chromatic* scales as repetitions of the same two intervals developing in a sort of *trichordon systema* throughout the whole two octave range of the *chromatic genera*. Although this is considered false by contemporary theoreticians and practitioners, the symbolic representation on the level of *martyries* remained unchanged.

²⁰ [Ethimiadēs, 1988, p. 241 ; Panagiotopoulos, 1949, p. 109].

²¹ The Committee's introduction of only even numbered *tmimata* alterations (2, 4, 6, 8, 10) created confusion and misunderstandings on

the level of the intervallic texture of this music. On the other end Karas utilized alteration of even half a *tmīma* like in case of intervals of 5½ or 7 ½ *tmīmata* (see [Karas, 1989, p. 16–28; 1993, p. 30–31].

²² [Karas, 1982a ; 1982b], [Konstantinou, 1997].

²³ [Chrysanthos (de Madytos) and Pelopidēs, 1832, p. 95–99].

²⁴ [Commission musicale de (Musical Committee of) 1881, Aphtonides, and al., 1888, p. 14–26].

²⁵ See [Ellis, 1885].

²⁶ In the present article, all correspondences of degree names as well as other Near Eastern musicological terms are made with reference to the Ottoman-Turkish theoretical model and the long tradition of comparative parallelism mentioned above. Thus *Rast perde* is the degree *Rast* of the fundamental scale of Turkish *makam* theory which corresponds to the degree *vη* of the Byzantine basic scale (Chalatzoglou (in [Popescu-Judetz et al., 2000, p. 35]) & [Kilzanidēs, 1991, p. 17]).

²⁷ [Chrysanthos (de Madytos) and Pelopidēs, 1832, p. 28 ; Commission musicale de (Musical Committee of) 1881, Aphtonides, and al., 1888, p. 20 ; Efthimiadēs, 1988, p. 66 ; Karas, 1989, p. 8] and [Chatziathanasiou, 1948, p. 10].

²⁸ [Chrysanthos (de Madytos) and Pelopidēs, 1832, p. 19–21, 25–28, 99].

²⁹ In the geometric method, addition of intervals is performed by multiplying their ratios while subtraction by dividing them.

³⁰ [Barker, 1989, v. II, p. 349].

³¹ [Commission musicale de (Musical Committee of) 1881, Aphtonides, and al., 1888, p. 14–21].

³² [Panagiotopoulos, 1949, p. 7–22].

³³ [Efthimiadēs, 1988, p. 200–201].

³⁴ [1982a ; Karas, 1982b ; 1989].

³⁵ [Lykouras, 1994, p. 26].

³⁶ Unfortunately the old method of measuring intervals by means of a monochord, used by most scholars mentioned above, seems somewhat superannuated nowadays and does not offer adequate proof to decide on such minute differentiations. Until modern laboratory results provide well-documented measurements on the actual intervals used in practice, these suggestions will continue to remain more in the domain of the fine art of abstract mathematics.

³⁷ Other recent contributions to intervallic theory are [Lekkas, 1986 ; 1987 ; Skoulios, 2007 ; Vetsos, 2001].

³⁸ Even though not directly referred to, *dodekatimoria* (lit. “particle equal to one twelfth of a tone” were already implied by Aristoxenos’ as the difference between 1/3 and 1/4 of the major tone (see [Barker, 1989, v. II, p. 645] and [Michaelidēs, 1982, p. 102–103].

³⁹ [Mathiesen, 1999, p. 292].

⁴⁰ [Misaelidēs, 1902].

⁴¹ [Karas, 1982a ; 1982b].

⁴² *Genera* is the plural of the Greek word *genus* literally meaning “gender”, “specie”.

⁴³ [Barker, 1989, v. II, p. 11–13 & 140].

⁴⁴ [Marcus, 1989, p. 271–323 ; Özkan, 1984, p. 41–50 ; Talāī, 2001, p. 10–32] [Jairazbhoy, 1995, p. 76–89].

⁴⁵ [Barker, 1989, v. II, p. 11–13 & 140].

⁴⁶ By incomplete here we mean tetrachords and pentachords whose ends do not form a perfect 4th and 5th respectively such as *Saba* tetrachord and *Eksik Segah*, *Eksik Miistear* and *Eksik Ferahnak* pentachords of Turkish theory [Özkan, 1984, p. 47–48].

⁴⁷ [Michaelidēs, 1982, p. 82].

⁴⁸ In the case of rhythm, *genera* was a categorization on the basis of the ratio between time duration of *thesis* (down-beat) and *arsis* (up-beat) resulting in the *daktyliko* (ratio 1:1), *iarmiko* (2:1), *paioniko* (3:2), and *epitrito* (4:3) *genera* (see [Barker, 1989, v. II, p. 188–189] & [Michaelidēs, 1982, p. 82]).

⁴⁹ [Karas, 1982a, v. A, p. 236].

⁵⁰ [Barker, 1989, v. II, p. 356–357].

⁵¹ [1982a ; Karas, 1982b].

⁵² The term “mild” is considered to describe the smooth and even transition from one degree to the other which is characteristic of both genera divisions (*diatonic* and *chromatic*) compared to the “tense” ones, where these transitions are more abrupt and steep due to the contrast created by their bigger size difference. Another way to understand the significance of the mild divisions is the common fact of the use of “mild” or neutral intervals (see Table 2) while in the tense divisions these neutral intervals do not exist. Along with the use of these mild intervals comes the extensive use of melodic attractions that characterize the performing attitude towards these intermediate degrees which tend to be very fluid in their intonation depending on a complicated system of oral aesthetic rules. Ancient scholars refer to several types of *diatonic* tetrachords using various names and many different combinations of intervals (see [Barker, 1989, v. II, p. 349–350]).

⁵³ The Mercatoric arithmetic system divides the octave in 53 Mercatoric commas and is employed in contemporary Turkish theory.

⁵⁴ The conversions from Byzantine *tmīmata* (*dodekatimoria*) into Mercatoric commas involve approximations in order for the measures of the corresponding intervals to be more easily conceived; see also Table 2.

⁵⁵ [Misaelidēs, 1902, p. 82–84], see also Table 2.

⁵⁶ we need to remind the reader at this point that all comparisons are made with reference to Turkish theory tetrachords.

⁵⁷ [Michaelidēs, 1982, p. 357–358].

⁵⁸ [Karas, 1982a, v. A, p. 4–23].

⁵⁹ [Barker, 1989, v. II, p. 12–13].

⁶⁰ Personal communication with P. Neohoritis, T. Apostolopoulos, T. Georgiadis, N. Andrikos etc.

⁶¹ [Chrysanthos (de Madytos) and Pelopidēs, 1832, p. 113–117].

⁶² [Commission musicale de (Musical Committee of) 1881, Aphtonides, and al., 1888, p. 20].

⁶³ [Misaelidēs, 1902, p. 62].

⁶⁴ see [Panagiotopoulos, 1949] or [Efthimiadēs, 1988], [1982a ; Karas, 1982b], [Konstantinou, 1997].

⁶⁵ [Efthimiadēs, 1988, p. 18–19 & 193–219].

⁶⁶ [Panagiotopoulos, 1949, p. 100–107].

⁶⁷ These special modulatory signs are *fthores* and *chroes* (see below).

⁶⁸ For an extended analysis of the *Thaat* system as well as an introduction of an upgraded 32-*Thaat* categorization of Indian Ragas see [Jairazbhoy, 1995].

⁶⁹ [Michaelidēs, 1982, p. 298–302].

⁷⁰ [Chrysanthos (de Madytos) and Pelopidēs, 1832, p. 25].

⁷¹ [Barker, 1989, v. II, p. 330].

⁷² Ancient Greek musicology refers to two main categories of degrees, *estotes* (lit. “fixed”) (Nicomachos) or *akinitoi* (lit. “non-movable”) (Aristoxenos) and *kinoumenoi* (lit. “movable”) : see [Michaelidēs, 1982, p. 126].

⁷³ [Katsifis, 1996, p. 101–106].

⁷⁴ [Chrysanthos (de Madytos) and Pelopidēs, 1832, p. 103].

- ⁷⁵ [Apostolopoulos, 2002, p. 215–220].
- ⁷⁶ [Commission musicale de (Musical Committee of) 1881, Aphantides, and al., 1888, p. 48–49].
- ⁷⁷ Apostolopoulos gives an analytical account of this in [2002, p. 216–219].
- ⁷⁸ [Mazaraki, 1993, p. 101].
- ⁷⁹ [Karas, 1982a, v. A, p. 6 of the introduction].
- ⁸⁰ [Karas, 1982a; 1982b].
- ⁸¹ [Efthimiadēs, 1988, p. 256–257, 261, 264].
- ⁸² [Konstantinou, 1997].
- ⁸³ [Psachos, 1978, p. 153, 170, 174; 1908, p. 1–58].
- ⁸⁴ [Katsifis, 1996].
- ⁸⁵ [Vetsos, 2001].
- ⁸⁶ [Apostolopoulos, 2002, p. 225].
- ⁸⁷ see [Karas, 1982b, v. B, p. 199–219] & [Efthimiadēs, 1988, p. 484].
- ⁸⁸ [Efthimiadēs, 1988, p. 465].
- ⁸⁹ Karas stresses the importance of the presence of the drone by saying that ‘having to refer to the *vasi* in one’s imagination is not the same thing as constantly hearing that note as a consonant reference drone’ (see [Karas, 1982b, v. B, p. 200]).
- ⁹⁰ [Katsifis, 1996, p. 101–106].
- ⁹¹ [Efthimiadēs, 1988, p. 47–62].
- ⁹² [Chrysanthos (de Madytos) and Pelopidēs, 1832, p. 81].
- ⁹³ [Tura, 1995, p. 12].
- ⁹⁴ [Panagiotopoulos, 1949, p. 133–138].
- ⁹⁵ As is the case for *Octoecho*s explained below, the *Dastgah* macro-system is not a categorization based on modal characteristics only, but instead it groups its entities in chains, using morphological, rhythmical and aesthetic criteria as well. The result is the 7 *Dastgah*- 5 *Avaz* complexes organization of the classical Persian music repertoire, each complex of which contains entities with various modal characteristics (see [Farhat, 1990; Caton, 2001; Talaī, 2001]).
- ⁹⁶ [Powers, 1980, p. 422–423].
- ⁹⁷ The philosophy of categorizing melodic material in modes sharing common melodic characteristics and organizing these modes in the form of a modal system has changed a lot during the long music history of this area. In the ancient period many theoreticians tended to balance between the attempt to accurately describe music practice and the intention to create an elegant strictly hierarchical and symmetrical model that reflects the order and symmetry of the universe. This endeavour produced modal systems which harmonized with the old cosmological principles, deriving from mathematics, numerology, astronomy, astrology, medicine and many other branches of human knowledge and research. Such systems were strictly hierarchical and symmetrical, having a small number of primary and a big number of secondary subordinate modal entities, organized in popular arithmetic schemes such as 7, 12, 24 or 12, 24, 48 etc. These systems were conceived as closed-ended concerning the primary modes and open-ended for the derivative and composite modes leaving free space for new creations (see [Wright, 2000, p. 800; Powers, 1980, p. 422, 423, 427, 428, 435]).
- ⁹⁸ [Wright, 2000, p. 800; Powers, 1980, p. 422, 423, 427, 428, 435].
- ⁹⁹ [Bor, 1999, p. 2–4].
- ¹⁰⁰ [Konstantinou, 1997, p. 68–71].
- ¹⁰¹ [Konstantinou, 1997, p. 68–71].
- ¹⁰² We can see here the direct reference to the ancient Greek idea of derivation of the basic modes by transposition of the *vasi* (finalis-tonic) on a reference “basic” scale apparent also in the old form of Middle Eastern modes and their Persian names *Yegah*, *Dugah*, *Segah*, *Chahargah*, *Pancgah*, *Shashgah*, *Hafdgah*. The latter originating from the Persian names of the numbers *yek* (one), *du* (two), *si* (three), *chahar* (four), *parj* (five), *shash* (six), *haft* (seven) and the suffix *-gah*, meaning “place,” position” (see [Feldman, 1996, p. 199]) obviously resemble with the alphabetic rationale of *Πα, Βο, Γα, Δι, Κε, Ζω, Νη*.
- ¹⁰³ [Konstantinou, 1997, p. 68–71].
- ¹⁰⁴ Related to that and therefore interesting to mention here is that one of the main reasons for the Committee’s introduction of the Western notion of absolute pitch and the assignment of the value of *do*=512 Hz to *νη*, was the Patriarchate’s desire to restrain chanters from performing in high registers [Commission musicale de (Musical Committee of) 1881, Aphantides, and al., 1888, p. 24].
- ¹⁰⁵ [Özkan, 1984, p. 120, 140, 288].
- ¹⁰⁶ [Signell, 1986, p. 60–65].
- ¹⁰⁷ [Apostolopoulos, 2002, p. 154–193].
- ¹⁰⁸ [Efthimiadēs, 1988, p. 354].
- ¹⁰⁹ [Panagiotopoulos, 1949, p. 172–238].
- ¹¹⁰ [Panagiotopoulos, 1949, p. 125–126].
- ¹¹¹ See for example [Panagiotopoulos, 1949, p. 205].
- ¹¹² [Siamakis, 1990, p. 39].
- ¹¹³ [Panagiotopoulos, 1949, p. 130–131].
- ¹¹⁴ The following presentation will restrict itself to a very concise structural description of the prominent modal entities of each one of the eight categories as they are being taught today, leaving out their particular characteristics such as the *apechema*, the *arktiki martyria*, the ambitus, the specific melodic attractions, the *ethos* and the typical *theseis*.
- ¹¹⁵ [Panagiotopoulos, 1949, p. 171–180], [Efthimiadēs, 1988, p. 355–364], [Konstantinou, 1997, p. 86–94], [Giannelos, 2009, p. 115–127].
- ¹¹⁶ [Panagiotopoulos, 1949, p. 181–189], [Efthimiadēs, 1988, p. 364–376], [Konstantinou, 1997, p. 169–191], [Giannelos, 2009, p. 115–127].
- ¹¹⁷ [Panagiotopoulos, 1949, p. 189–195], [Efthimiadēs, 1988, p. 377–382], [Konstantinou, 1997, p. 127–134], [Giannelos, 2009, p. 115–127].
- ¹¹⁸ [Panagiotopoulos, 1949, p. 196–204], [Efthimiadēs, 1988, p. 382–395], [Konstantinou, 1997, p. 111–126], [Giannelos, 2009, p. 115–127].
- ¹¹⁹ [Panagiotopoulos, 1949, p. 205–212], [Efthimiadēs, 1988, p. 396–411], [Konstantinou, 1997, p. 111–126], [Giannelos, 2009, p. 115–127].
- ¹²⁰ [Panagiotopoulos, 1949, p. 212–221], [Efthimiadēs, 1988, p. 411–421], [Konstantinou, 1997, p. 193–198], [Giannelos, 2009, p. 115–127].
- ¹²¹ [Panagiotopoulos, 1949, p. 225–228], [Efthimiadēs, 1988, p. 421–439], [Konstantinou, 1997, p. 148–159], [Giannelos, 2009, p. 115–127].
- ¹²² [Panagiotopoulos, 1949, p. 229–238], [Efthimiadēs, 1988, p. 439–453], [Konstantinou, 1997, p. 79–85 & 143–148], [Giannelos, 2009, p. 115–127].
- ¹²³ [Chrysanthos (de Madytos) and Pelopidēs, 1832, p. 122].
- ¹²⁴ [Karas, 1982a, v. A, p. 237].
- ¹²⁵ [Chrysanthos (de Madytos) and Pelopidēs, 1832, p. 170–171].
- ¹²⁶ [Karas, 1982b, v. B, p. 144].
- ¹²⁷ [Panagiotopoulos, 1949, p. 107–110], [Efthimiadēs, 1988, p. 238–244], [Giannelos, 2009, p. 95–98].
- ¹²⁸ [Barker, 1989, v. II, p. 328–329, 484].

¹²⁹ [Chrysanthos (de Madytos) and Pelopidēs, 1832, p. 169].

¹³⁰ [Panagiotopoulos, 1949, p. 336–340].

¹³¹ [Panagiotopoulos, 1949, p. 107–110], [Efthimiadēs, 1988, p. 238–244] Panagiotopoulos 1949:110-115 & Efthimiades 1988:224-230

¹³² [Panagiotopoulos, 1949, p. 107–110] & [Giannelos, 2009, p. 84–98].

¹³³ Numbers between parentheses indicate Mercatorian commas.